



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10:091,216	03/04/2002	Cornelis Adrianus Marinus Steenbergen	DVME-1022US	6092

7590 09/04/2003

KNOBLE & YOSHIDA, LLC  
Eight Penn Center, Suite 1350  
1628 John F. Kennedy Blvd.  
Philadelphia, PA 19103

EXAMINER
----------

LEE, JOHN D

ART UNIT	PAPER NUMBER
----------	--------------

2874

DATE MAILED: 09/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/091,216

Applicant(s)

STEENBERGEN ET AL.

Examiner

John D. Lee

Art Unit

2874

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 June 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

Receipt is acknowledged of papers submitted under 35 U.S.C. §§ 119(a)-(d), which papers have been placed of record in the file.

The five (5) sheets of formal drawing filed on June 11, 2002, are acceptable.

The specification is objected to because of the following deficiencies. Equations E2 on page 6 appear to be incorrect because of the notations “for  $z < z_k$ ” and “for  $z \leq z_k$ ”. It is believed that one of the “less than” symbols should actually be the “greater than” symbol. Appropriate correction is required. Applicant’s cooperation is requested in correcting any other errors that applicant may discover in the specification.

The following is a quotation of the second paragraph of 35 U.S.C. § 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 2-10, 12, 13, 15-18, and 20-24 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The recitation in claim 2 that the waveguide width *increases* is incomplete and indefinite because it should specify the *direction* in which the width increases. In claim 4, line 2, the term “at least some of the waveguides” is unclear because it could refer to the input waveguides, the output waveguides, or the waveguides in the coupling region. It is believed that “the waveguides in the coupling region” is the intended term. The term “any one of claim...” in the first line of claims 6, 8, 15-18, and 20-24 makes the dependency unclear and the claims indefinite since only one claim number follows this terminology. The recitation “and other mathematical approximation” in claims 6, 8, 16, 18, 22, and 24 is open-ended and non-specific and thus renders each claim indefinite. This term could refer to any number of mathematical equations. In claims 7, 17, and 23, equations E2 appear to

Art Unit: 2874

be incorrect because of the notations "**for  $z < z_k$** " and "**for  $z \leq z_k$** ". It is believed that one of the "less than" symbols should actually be the "greater than" symbol. The claims are thus indefinite. The last phrase in each of claims 7, 17, and 23 ("and R is the radius of curvature of the phase front") is not understood because there is no variable "R" in the equations E2. In claim 9, line 2, the term "the waveguides" is unclear because it could refer to the input waveguides, the output waveguides, or the waveguides in the coupling region. It is believed that "the waveguides in the coupling region" is the intended term. In claim 12, line 2, the phrase "at least one of said optical coupler is used..." is not understood, and the claim is thus indefinite. In claim 13, line 2, the phrase "the gaps between the waveguides" is unclear because it could refer to the input waveguides, the output waveguides, or the waveguides in the coupling region. It is believed that "the waveguides in the coupling region" is the intended term.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 2 are rejected under 35 U.S.C. § 102(b) as being clearly anticipated by the IEICE article by Tanaka et al (submitted by applicant). As seen and described in Figure 1(b),

Tanaka et al discloses an optical coupler comprising an input waveguide, a coupling region optically connected to the input waveguide, and a plurality of output waveguides each optically connected to the coupling region. Notice that the coupling region of Tanaka et al comprises a plurality of coupled waveguides which diverge with respect to each other in the light propagation direction. There is also a change in width of the coupling region waveguides along the light propagation direction.

Claim 1 is further rejected under 35 U.S.C. § 102(b) as being clearly anticipated by the Journal Of Lightwave Technology article by Rasmussen et al (submitted by applicant). Rasmussen et al discloses (see Figure 1) an optical coupler comprising a coupling region having a plurality of coupled waveguides which diverge with respect to each other in the light propagation direction. In the right column on page 2069, Rasmussen et al discloses that the coupling region of Figure 1 is optically connected to input and output optical waveguides (single-mode optical fibers).

Claims 1, 2, 4/1, 4/2, 9/1, 9/2, 14, 19, and 20 are rejected under 35 U.S.C. § 102(b) as being clearly anticipated by European Patent 0 598 622 A1 to Arii et al (submitted by applicant). In Figures 2A and 2B, Arii et al discloses an optical coupler comprising input waveguides, a coupling region optically connected to the input waveguides, and a plurality of output waveguides each optically connected to the coupling region. Notice that the coupling region of Tanaka et al comprises a plurality of coupled waveguides which first converge and then diverge with respect to each other in the light propagation direction. There is also a change in width of portions of the coupling region waveguides along the light propagation direction. The discussion of light leakage of the curved and tapered waveguides in Arii et al implies that at least some of

the waveguides in the coupling region have a width that is less than a critical width of the waveguide at a given wavelength.

Claims 1 and 9/1 are further rejected under 35 U.S.C. § 102(b) as being clearly anticipated by the IOOC-ECOC article by Okuda et al (submitted by applicant). As seen in Figure 3, Okuda et al discloses an optical coupler comprising input waveguides, a coupling region optically connected to the input waveguides, and a plurality of output waveguides each optically connected to the coupling region. Notice that the coupling region of Tanaka et al comprises a plurality of coupled waveguides which first converge and then diverge with respect to each other in the light propagation direction.

Claims 4/1, 4/2, 11, 12, 14, 19, and 20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the IEICE article by Tanaka et al (submitted by applicant). Tanaka et al states that there is scattering loss in the variable width coupling region waveguides (see Table 1), even though such loss is less than in the prior art devices. A person of ordinary skill in the art would obviously interpret this data to mean that at least some of the waveguides in the coupling region have a width that is less than a critical width of the waveguide at a given wavelength. The input and output waveguides of Tanaka et al are arrays of glass optical fibers (see abstract). To make such input and output waveguides be planar waveguides would not change any of the concepts involved in Tanaka et al and would thus have been obvious to a person of ordinary skill. Since the Tanaka et al coupler can be employed in a wide variety of communication devices (see **Introduction**) its use in an arrayed waveguide grating (AWG) would have been obvious.

Claims 11 and 12 are further rejected under 35 U.S.C. § 103(a) as being unpatentable over the Journal Of Lightwave Technology article by Rasmussen et al (submitted by applicant).

The input and output waveguides of Rasmussen et al, as noted above, are single-mode optical fibers. To make such input and output waveguides be planar waveguides would not change any of the concepts involved in Rasmussen et al and would thus have been obvious to a person of ordinary skill. Since the Rasmussen et al coupler can be employed in a wide variety of communication devices (see **Introduction**) its use in an arrayed waveguide grating (AWG) would have been obvious.

Claims 11 and 12 are further rejected under 35 U.S.C. § 103(a) as being unpatentable over European Patent 0 598 622 A1 to Arii et al (submitted by applicant). The input and output waveguides of Arii et al are optical fibers (see page 7). To make such input and output waveguides be planar waveguides would not change any of the concepts involved in Arii et al and would thus have been obvious to a person of ordinary skill. Since the Arii et al coupler can be employed in a wide variety of communication devices (see page 3) its use in an arrayed waveguide grating (AWG) would have been obvious.

Claims 11 and 12 are further rejected under 35 U.S.C. § 103(a) as being unpatentable over the IOOC-ECOC article by Okuda et al (submitted by applicant). The input and output waveguides of Okuda et al appear to be optical fibers (Figure 3). To make such input and output waveguides be planar waveguides seem to be clearly suggested by Okuda et al, however (see **Introduction**), and would thus have been obvious to a person of ordinary skill. Since the Okuda et al coupler can be employed in a variety of communication devices (see **Introduction**) its use in an arrayed waveguide grating (AWG) would have been obvious to the ordinarily skilled artisan.

Claims 3, 4/3, 5-8, 9/3, 10, 13, 15-18, and 21-24 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, and if amended to overcome the 35 U.S.C. § 112 rejection set forth above. None of the prior art documents relied on in the rejections above disclose or suggest optical couplers having waveguides in the coupling region wherein there is a change in width of portions of the coupling region waveguides along the light propagation direction, but the width of the gaps between these waveguides remains substantially constant. The prior art documents relied on in the rejections above also fail to disclose or suggest optical couplers having diverging waveguides in the coupling region wherein center lines in the gaps between these waveguides follow the lines of a field described by applicant's equations E1 and E2. The prior art documents relied on in the rejections above further fail to disclose or suggest optical couplers having diverging waveguides in the coupling region wherein one of the inputs generates a "plurality of peaks" amplitude distribution and the output waveguides are positioned at the lateral positions of such peaks.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent 6,278,813 to Takada et al shows an optical coupler having diverging waveguides in the coupling region which is employed in an arrayed waveguide grating (AWG).

All of the prior art documents submitted by applicant in the Information Disclosure Statement filed on June 11, 2002, including the documents relied on in the rejections above, have been considered and made of record. Note the attached initialed copy of form PTO-1449.


This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. § 103(a), the Examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any



Art Unit: 2874

evidence to the contrary. Applicant is advised of the obligation under 37 CFR § 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the Examiner to consider the applicability of 35 U.S.C. § 103(c) and potential 35 U.S.C. §§ 102(e), (f) or (g) prior art under 35 U.S.C. § 103(a).

Any inquiry concerning the merits of this communication should be directed to Examiner John D. Lee at telephone number (703) 308-4886. The Examiner's normal work schedule is Tuesday through Friday, 6:30 AM to 5:00 PM. Any inquiry of a general or clerical nature (i.e. a request for a missing form or paper, etc.) should be directed to the Technology Center 2800 receptionist at telephone number (703) 308-0956, to the technical support staff supervisor (Team 2) at telephone number (703) 308-3072, or to the Technology Center 2800 Customer Service Office at telephone number (703) 306-3329.

  
**John D. Lee**  
**Primary Patent Examiner**  
**Group Art Unit 2874**